

REMARKS

This is in response to the Office Action of 24 March 2004. Claims 6, 8 and 10-15 are pending in the application; and Claims 6, 8 and 10-15 have been rejected.

Claims 6, 8, and 10-15 have been cancelled; and Claims 16-27 have been added.

No new matter has been added.

In view of the amendments above and remarks below, Applicants respectfully request reconsideration and further examination.

About The Invention

The present invention relates generally to integrated circuits and structures therein, and more particularly relates to structures for reducing or preventing damage caused by local current concentration during a junction breakdown event.

Drawings

The Examiner has required the filing of a formal replacement drawing sheet effecting the changes previously proposed and approved.

Submitted herewith is a replacement drawing sheet incorporating the change to Fig. 1, i.e., adding the label "Prior Art" to Fig. 1. Applicants respectfully submit that this satisfies the requirement for corrected drawings.

Rejections under 35 USC 112, first paragraph

Claims 11, 12, 14 and 15 have been rejected under 35 USC 112, first paragraph as failing to comply with the written description requirement. More

particularly, the Examiner states that Applicants' original application does not disclose the entire combination of Claims 11 and 15, including all the limitations recited in Claims 6 and 8, in combination with a second conductivity type deep via disposed adjacent to, and in electrical contact with, the second region of Claims 6 or 8.

By this amendment Claims 11-12, and 14-15 have been cancelled. Applicants respectfully submit that this amendment renders the rejection under 35 USC 112, first paragraph moot.

Rejections under 35 USC 103(a)

Claims 6, 10, and 13 have been rejected under 35 USC 103(a), as being unpatentable over Isohata, et al., (JP 10321842 A) in view of Suzumura, et al., (US Patent 6,211,551). Claim 8 has been rejected under 35 USC 103(a), as being unpatentable over Isohata, et al., (JP 10321842 A) in view of Suzumura, et al., (US Patent 6,211,551), and further in view of Wondrak, et al., (US Patent 5,578,859).

By this amendment, Claim, 6, 8, 10, and 13 have been cancelled. Applicants respectfully submit that, this amendment to Claim 6, renders the rejection under 35 USC 103(a) moot.

New Claims 16-27

New Claims 16-24 are directed to a semiconductor structure such as that shown in Fig. 2. More particularly, Claims 16-24 are directed to a semiconductor structure, that includes a substrate of a first conductivity type; a first buried layer of a second conductivity type disposed on the substrate; a second buried layer of the first conductivity type disposed on the first buried layer, and separated from

the substrate by the first buried layer; an epitaxial region of the second conductivity type having a bottom surface disposed on the second buried layer, and further having a top surface; a first deep via disposed through the epitaxial region such that a first electrical pathway is formed from the top surface of the epitaxial region to the first buried layer; a second deep via disposed through the epitaxial region such that a second electrical pathway is formed from the top surface of the epitaxial region to the second buried layer; a contact region of the second conductivity type disposed in the epitaxial region, the contact region having a top surface that is coplanar with the top surface of the epitaxial region; and a protection region of the second conductivity type disposed in the epitaxial region, the protection region having a top surface that is coplanar with the top surface of the epitaxial region, and the protection region spaced apart from the contact region, and spaced apart from the first and second deep vias. Neither Isohata, et al., Suzumura, et al., or Wondrak, et al., alone or in combination, disclose or suggest the structures as recited in Claims 16-24, which include a pair of spaced apart deep vias of opposite conductivity type extending through an epitaxial layer to make contact with a respective pair of buried layers of opposite conductivity type, and further includes a contact region and a protection region spaced apart from the contact region, each of the contact and protection regions having the same conductivity type as the epitaxial layer but having higher doping concentrations. Support for these Claims can generally be found throughout the specification, and can more particularly be found at pages 2-5, and in Fig. 2.

New Claims 25-27 are directed to a semiconductor structure such as that shown in Fig. 4. More particularly, Claims 25-27 are directed a semiconductor structure, that includes a substrate of a first conductivity type; an epitaxial layer of a second conductivity type disposed on the substrate; a drain region of the second conductivity type disposed in the epitaxial layer; a protection region of the second conductivity type disposed in the epitaxial layer, spaced apart from the drain region, and comprising a ring around the drain region; a backgate region of the first conductivity type disposed in the epitaxial layer, and spaced apart from both the protection region and the substrate; a source region of the second

conductivity type disposed in the backgate region; a deep via of the first conductivity type disposed in the epitaxial layer, the deep via providing an electrical connection between the backgate region and the substrate; wherein the drain region and the protection region each have a doping concentration that is higher than the doping concentration of the epitaxial layer. Neither Isohata, et al., Suzumura, et al., or Wondrak, et al., alone or in combination, disclose or suggest the structure as recited in Claims 25-27. Support for these Claims can generally be found throughout the specification, and can more particularly be found at page 6, and in Fig. 4.

Conclusion

All of the rejections in the outstanding Office Action of 24 March 2004 have been responded to, and Applicants respectfully submit that the pending Claims 16-27 are now in condition for allowance.

Applicants respectfully request that a timely Notice of Allowance be issued in this case.

Respectfully submitted,

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